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FAUNISTIC STUDY OF THE CICINDELIDAE
(COLEOPTERA) OF IRAQ AND SOUTHWEST ASIA

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ABSTRACT

This is the first serious contribution to the study of tiger beetles of Southwest Asia, including 1 species of *Megacephala* and 50 species and subspecies of *Cicindela*. A key is formulated to species and subspecies, 8 of which are new taxa and are described. The geographic origins of the fauna are analyzed. The distribution of each species is given by the States of the area in which they occur.

INTRODUCTION

The Cicindelidae of Iraq have never been the subject of special study, and only a few species are known from faunal lists of Coleoptera collected from the area. Holdhaus (1919) recorded 5 species of tiger beetles from Iraq. Horn (1927) listed 12 species from Southern Iraq and the Gulf district. Derwesh (1963) recorded only 4 species.

The purpose of this study is to review the family as it occurs in Iraq and the neighbouring countries (Arabia, Persia, Syria etc.) and southern Turkey, since there are no great barriers separating the fauna of Iraq from that of neighbouring countries. Of the 35 genera of the world Cicindelidae recognized by Horn (1915), only 2 are known from Southwest Asia. Of these, *Megacephala* Latr. is represented here by 1 species and *Cicindela* L. by 50 species and subspecies.

The species of *Cicindela* are not arranged here under species-groups, since the inter-relationships of the species still need further study. There have been some attempts to divide the large, widespread genus *Cicindela* into smaller genera (Papp 1952; Rivalier 1950, 1954, 1957, 1961, 1963). Wallis (1961) pointed out that Papp's groups of *Cicindela* of North America do not correspond to Rivalier's segregates. Since there is no widely accepted subdivision of the genus I have considered the species of Southwest Asia as all belonging to *Cicindela*.

The Cicindelidae have long been treated as a distinct family. However more recently some workers (Crowson 1955, Lindroth 1974) have suggested that the cicindelids should be reduced as a subfamily of the Carabidae. The 2 groups are certainly related as adephagan beetles, but by their structure and life history the 2 families are distinct in many ways. I prefer to retain the tiger beetles in a separate family until the natural relationships of the primitive Geodephaga have been clarified.

KEY TO THE GENERA OF TIGER BEETLES OF SOUTHWEST ASIA

1. Scutellum visible; 3rd segment of maxillary palpi shorter than 4th..... *Cicindela* L.
- 1'. Scutellum not visible; 3rd segment of maxillary palpa longer than 4th..... *Megacephala* Latr.

Genus *Cicindela* L.

Linné, 1758, *Systema Naturae* (Edn.10) p. 407.

Type; *C. campestris* L. (designated by Latreille 1810, p. 425)

This is the largest and most important genus of the family. The species are very variable in size, colour, and distribution of setae, but they have a strong common appearance and whatever characters are adopted to separate the species into groups, there are always intermediate forms.

The species are extremely active and often very difficult to capture, being found running with great rapidity along roads or patches of damp or dry sand.

The external characters studied here for identification are outlined as follows:

1. *Tactile hair*. These arise singly from pores in the chitinous integument. It is found here that the supraorbital setae are not particularly important because they seem to vary individually in number, size and position; therefore I have not made any use of them in this cicindelid study. The anterior trochanter fixed seta is found to be very useful. If a seta has been rubbed off then the presence or absence of that seta could be determined by the presence or absence of a small pit marking the position of a setiferous seta.

2. *Pubescence and bristles*. The pubescence consists of short, very fine setae. Their presence or absence on the head regions, margins of the pronotum, and other parts of the body and appendages is useful. The bristles are longer, sometimes erect or stiffer; they are useful for separating species, especially the white bristles on the ventral side.

3. *Labrum*. The shape of the anterior margin of the labrum—whether sinuate or dentate, and number of teeth present—has been found to vary individually, and I have not used this character in the key.

4. *Pronotum*. This provides some constant characters and presents some differences between the species. The pronotum may be quadrate, trapezoid, or subcylindrical in shape. The surface is usually flattened or sometimes convex. Three grooves or sulci are present on the surface; the anterior and posterior grooves or sulci run through the anterior and posterior margin of the pronotum respectively, and the median runs through the median line of the pronotum.

5. *Elytra*. These provide the most useful and important characters used here as:

(a). The outline of the elytra in general being between oblong and parallel-sided to ovate. The elytral apices vary from being rounded, emarginate, and produced.

(b). Elytral markings (figs. 1-3). In describing these I have followed Schaupp's terms (1883); these were used by Leng (1902) and recently by Willis (1968). The elytral markings are quite variable and useful in identification. The normal and complete pattern consists of a humeral lunule (with or without a basal dot), middle band, and apical lunule. These markings may be connected to the margin by a marginal line. The markings may be reduced to only dots or there may be none at all.

(c). The surface ornamentation. The surface foveae, granules, and punctation have also been found to be useful. Leng (1902) recognized four

types of elytral puncturations: 1, "impunctate"; 2, "simply punctate" when without elytral granules beside each puncture; 3, "granulate punctate" when the surface is with raised points as well as with depressed punctures; 4, "semipunctate" when merely the anterior half is punctuate. I have not used these terms, but the terms coarsely punctuate, finely punctuate, and smooth are used here. Often the degree of puncturation or granulation varies from one part to another, and Leng's terminology cannot be used.

6. *Male genitalia.* The male genitalia of *C. alboguttata* Klug (fig. 4A) were studied in some detail to illustrate their structures and their differences from those found in some other species (figs. 4-5).

Median lobe tubular, curved in shape, swollen along the distal two-thirds, and narrowed toward basal end; median orifice being in shape of a slit along ventral side of the distal end of the lobe. Median foramen in shape of a circular opening receiving the ejaculatory duct at basal end of the median lobe.

Lateral lobes slender, about 2/3 as long as median lobe, styliform, and tapering at their distal end. Each lobe has a small swollen area at the point where it connects to the arm of the basal piece.

Basal piece V-shaped, connected to lateral lobes about half way from their bases. Both lateral lobes and basal piece are connected together by a membrane enclosing the median lobe at base, here called "basal membrane".

Internal sac large, membranous, and coiled when invaginated. When everted through the median orifice it shows small sclerites at the distal end; some of the sclerites have serrate margins.

The median lobe and the internal sac provide the most useful characters in separating the species. The internal sac may be just a membranous structure devoid of any sclerite or flagellum. When the sclerites are present then their shape, number, and position are useful in separating closely related species.

KEY TO THE SPECIES OF *Cicindela* L.

1.	Elytral epipleura furnished with setae at the sides of metasternum. Genae, frons and vertex bare; pronotum setose; abdominal segments with only fixed setae on each side. 7½-9 mm	<i>C. pseudodeserticola</i> Horn
1'.	Elytral epipleura bare throughout their length	2
2(1').	Trochanters of fore-legs with setiferous punctures apically	3
2'.	Trochanters of fore-legs without setiferous punctures apically.....	47
3(2).	Abdomen furnished with more or less white setae or pubescence on sides	4
3'.	Abdomen bare or with only fine weak scattered setae or pubescence	33
4(3).	Genae bare	5
4'.	Genae heavily or partially setose.....	25
5(4).	Pronotum bare	6
5'.	Pronotum wholly or partially setose	11

- 6(5). Elytra elongate, parallel-sided, with alternate bronze and testaceous stripes running from base to apex 7
- 6'. Elytra shorter and less parallel-sided, without alternate longitudinal stripes..... 8
- 7(6). Head and pronotum dull coppery with dorsal surface finely sculptured; pronotum contracted behind, median line not well marked, sides of prothorax with large punctures. 15-17 mm *C. quadrilineata* Fabr.
- 7'. Head and pronotum shiny green with dorsal surface smooth; pronotum not contracted behind, median line well marked, sides of prothorax only finely punctate. 17½-18 mm.....
..... *C. schmidti* Horn
- 8(6'). Pronotum about as long as wide or very slightly transverse, subcylindrical. Upper side bronze green, underside violaceous. Head finely rugose and bright green at sides. Elytra bronze green, broad white margins. 13-14 mm.....
..... *C. helferi* Schaum
- 8'. Pronotum distinctly transverse, wider than long..... 9
- 9(8'). Pronotum with sides rounded; elytra bright blue or bronze with very irregular testaceous margins. Head and pronotum rather strongly sculptured, the latter contracted behind. 12-14 mm *C. bellana* Horn
- 9'. Pronotum with sides straight and parallel; head and pronotum finely sculptured 10
- 10(9'). Disc of pronotum convex and wrinkled; elytra bronze green with a broad irregular white margin starting from base round the apex; elytral apex in female produced posteriorly. 16-17½ mm *C. hanseatica* Horn
- 10'. Disc of pronotum flat and smooth; elytra bronze with testaceous margin from shoulder to apex; elytral apex in female rounded. 15-19 mm *C. ruppeli* Quer.
- 11(5'). Pronotum with lateral setae invading disc and both anterior and posterior margins..... 12
- 11'. Pronotum with only lateral margins setose 18
- 12(11). Labrum large and produced anteriorly into a circular border; anterior coxae heavily covered with setae; abdomen very thickly clothed with white setae laterally 13
- 12'. Labrum normally developed with its margin not produced anteriorly; anterior coxae sparsely setose; abdomen with short fine setae laterally 14
- 13(12). Elytra almost parallel-sided with apex in both sexes drawn in; elytral punctures shallow; colour bronze with slight greenish gloss, first antennal segment reddish. 12-13 mm.....
..... *C. deserticola* Fald.
- 13'. Elytra distinctly widened behind with apex only drawn in slightly in male; elytral punctures wider and deeper; colour greenish bronze, first antennal segment metallic green. 9½-14 mm *C. chiloleuca* Fisch.
- 14(12'). Pronotum subcylindrical, median line obsolete; colour shiny bronze green; elytral apex of male not produced behind. 9-11.5 mm *C. pseudolitorea* Ali, new species

- 14'. Pronotum quadrate in female and subcylindrical in male, median line distinct; colour coppery bronze to testaceous..... 15
- 15(14'). Pronotal disc less setose around sides; elytral markings extended and confluent internally, leaving a V-shaped unmarked space. 10.5-11.5 mm.....
..... *C. litorea eudeserticola* Ali, new subspecies
- 15'. Pronotal disc more setose around margins; elytral markings normally extended 16
- 16(15'). Elytra ovate in both sexes, apex normally rounded; elytral markings narrow with their confluent parts more confined to margins; smaller in size. 8.5-9 mm.....
..... *C. abbasi* Ali, new species
- 16'. Elytra oblong in male with apex produced, laterally dilated in female with apex truncate; elytral markings wider with their confluent parts extended internally; larger in size 17
- 17(16'). Elytral markings well defined and white in colour; head behind eyes finely microsculptured; elytra only widened laterally in female. 10-11.5 mm.....
..... *C. litorea jiddaica* Ali, new subspecies
- 17'. Elytral markings not well defined and testaceous in colour; head longitudinally wrinkled; elytra in female widened and with flanged margins. 11-14 mm..... *C. litorea* Forsk.
- 18(11'). Venter of abdomen heavily punctate 19
- 18'. Venter of abdomen only scarcely punctate 23
- 19(18). Frons next to eyes coarsely wrinkled; frons and first antennal segment bare; elytral apex in male not drawn in and in female very little so 20
- 19'. Frons next to eyes smooth; larger in size..... 21
- 20(19). Colour coppery red; pronotum flat and quadrate; labrum pale testaceous; elytral punctures shallow with their borders flat. 7-7.5 mm *C. pygmaea* Dej.
- 20'. Colour bronze green; pronotum subcylindrical and convex; elytral punctures deeper with their borders raised anteriorly. 5.5 mm..... *C. nedhalensis* Ali, new species
- 21(19'). Elytral apex in male strongly drawn in, in female broadly rounded; pronotum almost as long as wide; elytral surface reddish with shiny green and pale whitish lunules. 8-12 mm *C. trisignata* Dej.
- 21'. Elytral apex very slightly or never drawn in in male and never broadly rounded in female; pronotum longer than wide 22
- 22(21'). Disc of fourth and fifth abdominal sternites punctate; hind trochanters metallic; femora metallic green. 7.5-9 mm.....
..... *C. litterifera* Chaud.
- 22'. Disc of fourth and fifth abdominal sternites impunctate; hind trochanters testaceous; femora metallic bronze; elytral apex in female produced behind. 9-9.5 mm ... *C. contorta* Fisch.
- 23(18'). Frons next to eyes with coarse wrinkles; underside coppery; antennae metallic green; pronotum subcylindrical, median line not well marked; elytral surface metallic green with

- bluish foveae. 9-10 mm *C. rectangularis* Klug
- 23'. Frons next to eyes with fine wrinkles; pronotum almost quadrate 24
- 24(23'). Elytral markings dull coppery green, surface darker; labrum with 4 fixed setae; elytra with humeral and apical lunules and a middle band. 9-12.5 mm *C. melancholica* Fabr.
- 24'. Elytral markings pale, surface coppery bright green with white dots near to the suture on the hind third, between the middle band and the apical lunule. 10-13.5 mm *C. orientalis* Dej.
- 25(4'). Sides of abdomen covered with thick white setae; middle parts almost bare or only finely pubescent 26
- 25'. Sides of abdomen covered with short pale pubescence 33
- 26(25). Frons and clypeus bare; genae partially setose; pronotum with lateral setae invading disc; labrum and base of mandibles yellow; colour metallic green *C. zarudniana* Tsch.
- 26'. Frons and clypeus setose at least on sides 27
- 27(26). Pronotum with lateral setae invading disc; elytra narrowed towards base; central band of elytra mostly continues posteriorly along the suture and almost meets the sutural extension of the apical lunule. 8-9 mm *C. sublacerata* Solsky
- 27'. Pronotum with lateral setae not invading disc 28
- 28(27'). Elytra and body unicoloured, metallic greenish red; frons bare on its disc; third and fourth antennal segment each with row of white hairs. 11-14.5 mm *C. concolor* Dej.
- 28'. Elytra with distinct markings 29
- 29(28'). Frons at front of disc bare 30
- 29'. Frons at front of disc setose 31
- 30(29). Colour blue; elytral markings broken into spots, usually no lunules; clypeus with sides sparsely setose; labrum with more than one row of setae. 11-12 mm *C. alboguttata* Klug
- 30'. Colour green; both humeral and apical lunules present; clypeus with sides heavily setose; labrum with more than one row of setae. 8.8-10.5 mm *C. euarabica* Ali, new species
- 31(29'). Elytral markings with both the humeral lunule and the middle band broken into 2 spots, forming 4 spots on each besides the apical lunule; colour bluish green to blue. 9-12 mm *C. fischeri* Ad.
- 31'. Elytra with the humeral lunule and middle band not broken 32
- 32(31'). Pronotum almost as long as wide; upper surface of elytra reddish green, markings white; elytral foveae coarse. 12-14 mm *C. sturmi* Men.
- 32'. Pronotum distinctly longer than wide; upper surface of elytra dark metallic reddish green, elytral markings pale, foveae fine. 9-14 mm *C. caucasica* Ad.
- 33(3'). Lateral margins of pronotum and disc bare 34
- 33'. Lateral margin of pronotum more or less setose 35
- 34(33). First antennal segment plurisetose; lateral margins of prothorax sparsely covered with long erect white setae; hind

- femora heavily covered with rows of long setae; each elytron with yellowish lateral stripe running from the humeral angle to the apex; ground colour reddish brown with violaceous tinge. 11-14 mm *C. lacteola* Pall.
- 34'. First antennal segment unisetose; lateral margins of prothorax thickly covered with white setae; hind femora with rows of short scattered setae; elytra dark green with white margins; elytra ovate, broadcast at middle; head and pronotum metallic bluish green. 8-9 mm *C. copulata* Schmidt-Goeb.
- 35(33'). Clypeus bare 36
35'. Clypeus setose 41
- 36(35). Sutural striae of elytra punctate especially behind; elytra with 5 isolated spots, the apical sometimes obsolete, no humeral spot or middle band; lower surface coppery violaceous; larger in size. 13.5-20 mm *C. decempustulata* Men.
- 36'. Sutural striae not punctate along length; elytra without a humeral spot but with only 2 markings; smaller in size 37
- 37(36'). Genae setose especially anteriorly; elytra with 4 isolated spots, 1 humeral, the second a little behind it, the third on the disc and the fourth apical; underside of head and thorax coppery bronze, abdomen violaceous. 14-18 mm
..... *C. asiatica* Brullé
- 37'. Genae smooth and bare; elytra with middle bands or with 5 or only 2 isolated spots 38
- 38(37'). Elytra with only 2 isolated spots on each elytron; anterior and posterior furrows of pronotum broad and extended more transversely; lower surface of thorax coppery green, of abdomen violaceous with greenish blue, shiny. 10-13 mm *C. ismenia* Gory
- 38'. Elytra with transverse band or with 5 isolated spots 39
- 39(38'). Elytra with middle band; apical spots confluent forming a lunule; colour coppery green, violaceous below, coppery on sides of thorax. 11-15 mm *C. turkestanica* Ball.
- 39'. Elytra without middle band; apical lunule present, with 3 or 2 isolated spots or with only 5 isolated spots 40
- 40(39'). Proepisterna glabrous; pale elytral markings restricted to margins, as 2 isolated spots and an apical lunule; colour dull green to bluish coppery; female without dark spot on the anterior third of elytra. 9-11.5 mm *C. germanica* L.
- 40'. Proepisterna densely covered with white setae; pale, elytral markings more expanded having 5 isolated spots; the 2 apical spots may be confluent; female always with small dark spot on the anterior third of the elytra near suture. 9-18 mm *C. campestris* L.
- 41(35'). Elytra flat, elytral spots narrow and sometimes confined to margin; aedeagus more curved and produced; tarsi shorter 42
- 41'. Elytra more convex, elytral spots well developed forming 8 spots on each when lunules divided; aedeagus much straighter; tarsi longer 44

- 42(41). Colour black, labrum testaceous; elytra oblong; head strongly striate; pronotum quadrate. 10-16 mm.... *C. lunulata* Fabr.
- 42'. Colour coppery to greenish, labrum pale; elytra ovate or parallel-sided; pronotum contracted behind..... 43
- 43(42'). Colour dull coppery green; labrum and sides of clypeus moderately setose; elytra ovate, markings relatively wide. 11-17 mm *C. lunulata nemoralis* Ol.
- 43'. Colour shiny coppery bronze; labrum and sides of clypeus heavily setose; elytra parallel-sided, markings narrower and confined to margins. 10-12 mm.....
..... *C. lunulata khorassanica* Ali, new subspecies
- 44(41'). Elytra almost parallel-sided, apex rounded; elytral surface dark blue including sutures, granulate behind; labrum and base of mandibles brown. 14-16 mm *C. aphrodisia* Baudi
- 44'. Elytra distinctly round-sided, apex more or less drawn in; elytral surface dark metallic green, bronze coppery and more bluish behind or entirely blue 45
- 45(44'). Colour entirely blue on upper and lower sides; pronotum shorter than wide, sides less rounded; elytral apex less drawn in. 10-14 mm *C. aulica diania* Tsch.
- 45'. Colour either dark metallic green above or coppery bronze green becoming more bluish on posterior part of elytra; pronotum longer or as long as wide, sides rounded; elytral apex distinctly drawn in 46
- 46(45'). Elytral surface almost uniform in colour, dark metallic green with foveae distinct posteriorly but shallower, elytral sides less rounded. 13-15 mm..... *C. aulica* Dej.
- 46'. Elytral surface coppery bronze at base and dark bluish toward the hind two-thirds; foveae on elytra disappear posteriorly, elytral apex deeply drawn in.....
..... *C. aulica bahreinica* Ali, new subspecies
- 47(2'). Abdomen furnished with thick white hairs, especially at sides..... 48
- 47'. Abdomen bare or with only fine weak scattered pubescence and setae..... 50
- 48(47). Pronotum thickly setose, light colour with dark red markings giving bluish gloss; markings confined to the elytral disc; lower surface of pro- and mesepisterna thickly clothed with white setae *C. histrio* Tsch.
- 48'. Pronotum slightly setose, ground colour red or green; elytral markings formed of lunules and dots reaching lateral margin..... 49
- 49(48'). Ground colour metallic red; underside of abdomen metallic with violaceous gloss; sides of thorax and femora coppery; labrum and base of mandibles yellow; elytral base with humeral lunule and 2 spots. 10.5-12.5 mm.....
..... *C. flexuosa* Fabr.
- 49'. Ground colour metallic green, underside of abdomen dull green, thorax and femora coppery green; elytral base with 2 spots only, one of these on the humeral angle; lower sides of pro- and mesepisterna sparsely setose *C. hilariola* Bates

- 50(47'). Elytra and body unicoloured, dark bronze with violaceous red gloss becoming metallic green on anterior region of head and mouth parts; lateral margins of prothorax very sparsely setose..... *C. immanis* Bates
- 50'. Elytra pale with distinct brown markings; head and pronotum brownish red to greenish red; lateral margins of prothorax densely clothed with white setae *C. singularis* Chaud.

DESCRIPTION OF THE NEW SPECIES

During the course of this study of the Cicindelidae of Iraq and South-west Arabia, I found 4 new species and 4 new subspecies. These are described below.

Cicindela euarabica Ali, **new species**

Head: Labrum, base of mandibles, and palpi yellow; labrum has 2 rows of setae; clypeus heavily setose on sides and glabrous at middle; frons anteriorly with a tuft of setae on each side and glabrous on disc; vertex glabrous, genae heavily setose, ventral side of head glabrous.

Thorax: Prothorax subcylindrical, anterior and posterior angles of pronotum not distinct; transverse anterior and posterior furrows deep, median line present but shallow at middle; lateral margins of pronotum setose, anterior and posterior margins and disc glabrous; lateral margins of thorax covered with white setae; anterior and middle trochanters and coxae each with fixed seta at apex; anterior and middle coxae setose anteriorly; anterior and middle femora with rows of hook-shaped setae; anterior basal 3 tarsal segments in male dilated and clothed ventrally with fine brown bristles.

Elytra: Parallel-sided in male and distinctly widened behind in female, not punctured but smoothly granulated; on each are humeral and apical lunules, transverse band, and 2 spots; one spot is marginal and the second is discoidal, both situated between transverse band and apical lunule.

Sides of abdominal segments clothed with white pubescence, smooth and glabrous at middle.

Length 8.8-10.5 mm.

Male genitalia: Median lobe more slender and straight than in *C. alboguttata* Klug, and less sclerotized; median foramen at basal end and median orifice in shape of a short slit along ventral side of distal end of lobe; lateral lobes styliform, connected to V-shaped basal piece at base.

Internal sac membranous when invaginated, coiled, with small sclerites which arise at apex of sac when evaginated through median orifice, fig. 4B.

Comparative notes: This species is closest to *C. alboguttata* Klug, but it is green in colour, elytra with humeral lunule instead of a spot, labrum with 2 rows of setae, frons more striate, and thorax laterally only sparsely setose instead of heavily so.

Distribution: Holotype male: Arabia, 11.iv.1947, W. Thesiger, B.M. 1948-21.

Paratypes 4 males and 9 females from the same locality.

Holotypes and paratypes are in the British Museum (N.H.)

Cicindela nedhalensis Ali, **new species**

Colour green with coppery gloss; ventral side bronze. This is the smallest species that has ever been recorded.

Head: Frons between eyes closely striate; labrum, base of mandibles and palpi yellow, labrum with marginal row of setae.

Thorax: Prothorax as long as wide, subcylindrical; pronotum irregularly wrinkled and laterally setose; lateral margins of thorax heavily clothed with long white setae; anterior and middle trochanters each with fixed seta at apex; anterior and middle coxae each with tuft of white setae anteriorly; femora provided with rows of white erect setae.

Elytra: With sides parallel, much wider than pronotum, green in colour, punctured; punctures in form of deep rounded pits, uniformly distributed, their anterior

borders somewhat raised, especially on anterior part of elytra; each elytron with well defined humeral lunule, apical lunule, and transverse band.

Underside and legs bronze, sides of abdominal segments heavily clothed with white pubescence.

Length 5.5 mm.

Male genitalia: Median lobe curved, tubular median orifice forming slit along ventral side of apex; basal piece V-shaped, lateral lobes slender. Internal sac membranous, relatively large, having no sclerites nor a flagellum, fig. 4C.

Comparative notes: This species differs from *C. pygmaea* Dej. from Arabia in its green colour, the latter being bronze red; labrum and base of mandibles and palpi yellow; prothorax narrower; elytral punctures having the anterior borders distinctly raised; median line of pronotum more distinct.

Distribution: Holotype male: Syria.

Paratypes, 3 males and 2 females from same locality; all in British Museum (N.H.)

Cicindela lunulata khorassanica Ali, **new subspecies**

Colour, metallic coppery bronze.

Head: Very much striated on frons and between eyes; labrum and base of mandibles testaceous, the former heavily setose.

Thorax: Prothorax subcylindrical; pronotum with posterior and anterior furrows deep, median line distinct, disc roughly sculptured and setose laterally; lateral margins of thorax heavily setose.

Elytra: With sides parallel and rounded apex; each elytron with narrow humeral and apical lunules, transverse band, and rounded spot between transverse band and apical lunule; elytral surface shining, punctured, punctures closer at base, with sprinkling of larger punctures on base and disc.

Lateral margins of abdominal segments clothed with white setae, the middle parts with fine pubescence and each with a row of longer setae.

Length 9.5-11 mm.

Male genitalia: Median lobe tubular, more curved than in *C. aulica* Dej., median orifice a large slit, lateral lobes styliform and slightly bent at the point where they join basal piece.

Internal sac membranous having sclerites towards apex, the most apical sclerite serrate on its outer margin, fig. 4D.

Comparative notes: This subspecies is allied to *C. lunulata* but differs in having the labrum more heavily setose, the colour shiny metallic coppery and the elytral markings narrower, more restricted to the margin.

C. lunulata nemoralis Ol., differs from this subspecies by having the labrum with one row of setae, body convex, dull colour, and lateral margins of prothorax sparsely setose.

Distribution: Holotype male; Persia (Khorassan) 1.ix.1958, Oxford North Khorassan Expedition.

Paratypes, 3 males from same locality. All in British Museum (N.H.)

Cicindela pseudolitorea Ali, **new species**

Colour bronze green, ventral surface with testaceous shine; basal 4 antennal segments bronze, remaining segments red; elytral markings yellow.

Head: Labrum and base of mouthparts yellow, labrum with small tooth in middle and marginal row of setae; clypeus, vertex, and genae glabrous.

Thorax: Prothorax subcylindrical, anterior and posterior transverse furrows deep; midline not distinct; pronotum setose except for small space on disc; lateral margins of thorax heavily setose; anterior 3 basal tarsal segments dilated in male and ventrally heavily clothed with red bristles; anterior and middle coxae and trochanters each with fixed seta at apex; anterior and middle femora provided with rows of short setae.

Elytra: Elytral markings formed of humeral and apical lunules and transverse band; elytral microsculptures formed of violet blue shallow pits; flattened granules on the spaces between pits.

Lateral margins of abdominal segments heavily clothed with white setae and with very fine scattered pubescence at middle.

Male genitalia: Median lobe curved, median orifice forming relatively long slit along ventral side of distal end; lateral lobes styliform, connected to a V-shaped basal piece.

Internal sac large, membranous, provided with 5 sclerites and coiled flagellum, fig. 5A.

Comparative notes: This species is allied to *C. litorea* Forsk, but with narrower body and bronze green colour, the latter having wider elytra and being brownish in colour; elytral markings better defined; prothorax cylindrical instead of quadrate as in *C. litorea*; pronotal setae less distributed, leaving larger space glabrous on the disc.

Distribution: Holotype male; Arabia (Sabiya), December 1945, L. A. Tillin, B. M. 1948-19.

Paratypes; Arabia (Asir and Sabiya) 1.xii.1946 G. V. Popov, B. M. 1948-273, 2 females. All in British Museum (N.H.)

Cicindela aulica bahreinica Ali, **new subspecies**

Head: Metallic bronze, striate between eyes; labrum yellow with its border entire, its surface heavily setose; clypeus sparsely setose; frons and vertex glabrous, genae heavily setose.

Thorax: Pronotum a little longer than wide, median line distinct, lateral margins slightly contracted behind, with margins setose and surface roughly microsculptured; lateral margins of thorax moderately covered with long white setae; anterior and middle trochanters each with setiferous seta.

Elytra: Sides almost parallel, rounded at apex and more drawn in in female; each elytron with humeral and apical lunules, transverse band, and 2 spots between transverse band and apical lunule. Lateral margins of abdominal segments clothed with short white setae and finely pubescent at middle.

Length 10.5-11.5 mm.

Male genitalia: Median lobe slightly curved, median orifice forming slit along ventral side of distal end of lobe; lateral lobes styliform and connected to V-shaped basal piece. Internal sac membranous, with 3 small sclerites at apex, the most apical sclerite having its ventral margin serrate, fig. 5B.

Comparative notes: This subspecies is superficially similar to *C. lunulata diania* Tsch. from Persia, but it differs by having the elytral apex deeply drawn in and by its elytral colour being coppery bronze at base and dark bluish towards the hind two-thirds; in the latter the colour is entirely blue and the elytral apex is less drawn in.

Distribution: Holotype male: Bahrein, 3.ix.1935, J. F. Fernandez, B. M. 1935-571.

Paratypes 3 males and 4 females from the same locality.

All in British Museum (N.H.)

Cicindela abbasi Ali, **new species**

Head: Metallic bronze, very finely microsculptured; labrum and base of mandibles yellow; the former 6-setose, its anterior border sinuate in male and with small tooth at middle in female.

Thorax: Pronotum quadrate, setose except the disc which has few scattered setae; anterior and posterior furrows deep, median line not distinct; lateral margins of thorax heavily setose; trochanters and coxae of both anterior and middle legs each with fixed seta.

Elytra: Ovate in both sexes, apex truncate in female and normally produced in male; on each elytron are humeral and apical lunules and transverse band, the markings confluent only on elytral margin; elytral ornamentation formed of fine pits violaceous blue in colour with bronze granulated spaces between.

Underside testaceous in colour with coppery bronze gloss; lateral margins of abdominal segments clothed with white setae, the larger remaining parts very finely and sparsely pubescent.

Length 8-9 mm.

Male genitalia: Median lobe curved, with moderate sized median orifice; lateral lobes slender, connected to a V-shaped basal piece. Internal sac large, bulbous in shape, with 5 sclerites at distal half, with a flagellum arising from apex, fig. 5C.

Comparative notes: This species is allied to *C. litorea* Forsk, but is distinguished by its smaller size, the shorter elytra being ovate and dilated in both sexes; elytral markings very well defined and only confluent at margins; elytral apex not greatly produced in male.

Distribution: Holotype male: Arabia (Wadi Ama) II.ii.1937, H. St. J. B. Philby, B. M. 1937-228.

Paratypes; Arabia (Jizan) 14.12.1936, B. M. 1937-228, 1 male, 1 female. All in the British Museum (N.H.)

Cicindela litorea eudeserticola Ali, **new subspecies**

Head: Metallic bronze; frons and vertex striate between eyes; labrum yellow, its anterior margin slightly sinuate, having minute median tooth; clypeus, frons, vertex, and genae glabrous.

Thorax: Pronotum quadrate, median line not distinct; sides of pronotum setose; lateral margins of thorax heavily clothed with white setae; anterior and middle trochanters each with setiferous seta.

Elytra: Sides widened in female and oblong in male, apex truncate in female and slightly produced in male; elytral markings yellow, confluent, leaving small V-shaped coppery coloured area punctured with sprinkling of larger punctures at base.

Lateral margins of abdominal segments heavily clothed with short white setae and finely punctured at middle.

Length, 10.5-12 mm.

Comparative notes: This subspecies is closely related to the *C. litorea* group but is distinguished from other subspecies by its elytral markings being extended internally and confluent, occupying the largest space and leaving only a V-shaped area unmarked; it is equally well separated by having the labrum only slightly sinuate, the pronotum quadrate with sides only sparsely setose.

Distribution: Holotype female: Arabia (Jidda) 12.vi.1929, H. St. J. B. Philby, B. M. 1929-361.

Paratypes, 3 females from same locality. All in British Museum (N.H.)

Cicindela litorea jiddaica Ali, **new subspecies**

Head: Head bronze in colour with frons between eyes closely striate; labrum pale in colour, with median tooth and row of six setae; clypeus, frons, vertex, and genae glabrous.

Thorax: Pronotum quadrate in female and subcylindrical in male, setose except on disc; lateral margins of thorax heavily setose; anterior and middle coxae and trochanters each with fixed setiferous seta at apex.

Elytra: Oblong in male and oval in female, elytral markings confluent, not well defined, pale in colour; remaining area coppery bronze, elytral punctures moderately deep and bronze in colour with coppery spaces between; no granules present; elytral apex produced in male and truncate in female.

Lateral margins of abdominal segments heavily clothed with white setae and very finely pubescent at middle.

Length 10-11.5 mm.

Comparative notes: This subspecies is similar to *C. pseudolitorea* and to *C. litorea*. It differs from the former by having coppery bronze colour, the elytral markings confluent, and a more setose pronotum. *C. litorea* is distinguished from this subspecies by its dull coppery colour, a less setose pronotum and the broader elytral margins being flanged in the female; elytral markings in *C. litorea* testaceous, becoming darker apically.

Distribution: Holotype female: Arabia (Jidda), 4.iv.1929, H. St. J. B. Philby, B. M. 1930-357.

Paratypes: 2 females from the same locality. All in British Museum (N.H.)

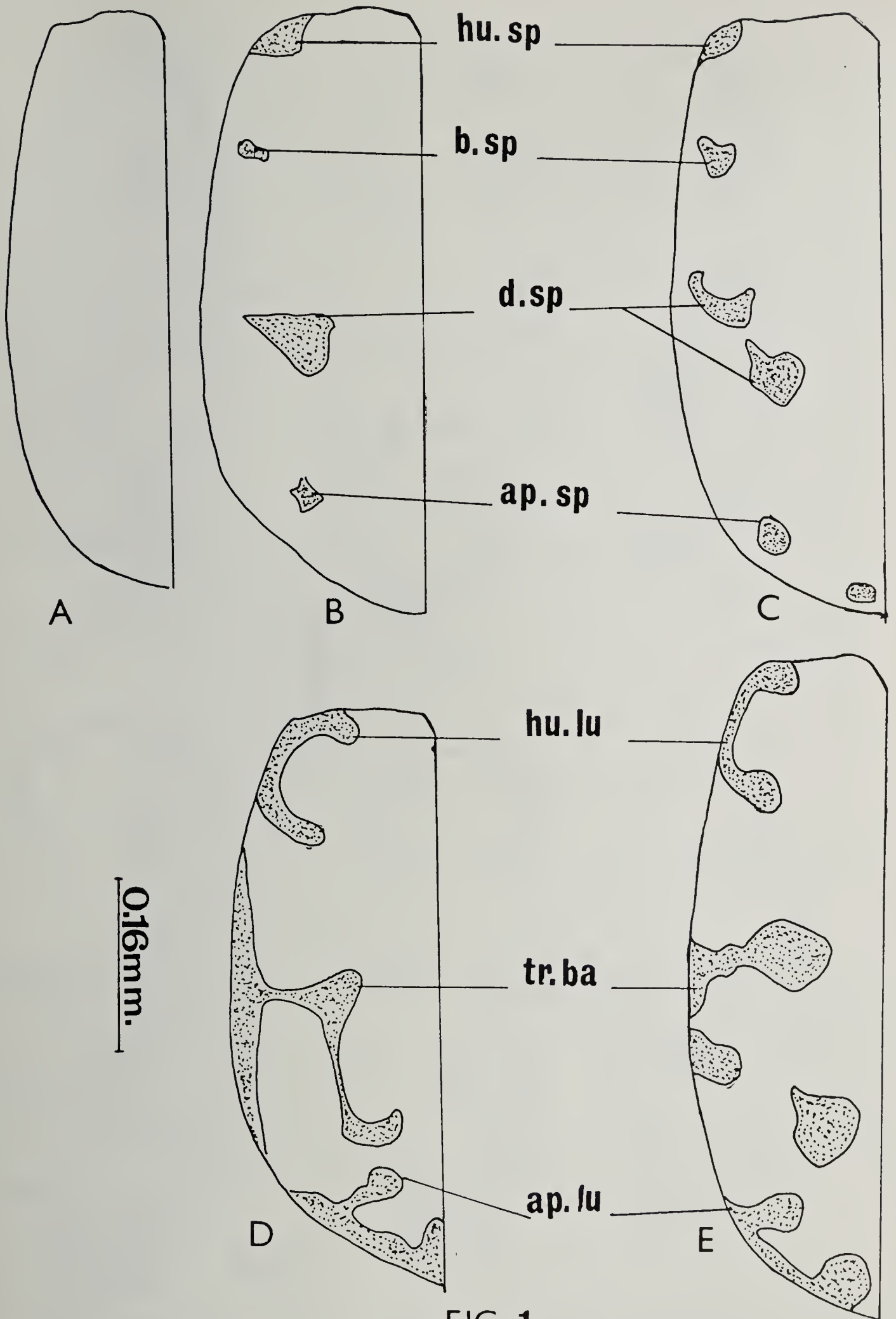


FIG. 1

Fig. 1, elytra: A, *C. concolor* Dej.; B, *C. asiatica* Aud.; C, *C. campestris pseudomaroccana* Roeshke; D, *C. aphrodisia* Baudi; E, *C. sturmi* Menetr. (*ap. lu* = apical lunule; *ap. sp* = apical spot; *b. sp* = basal spot; *d. sp* = discoidal spot; *hu. lu* = humeral lunule; *hu. sp* = humeral spot; *tr. ba* = transverse band).

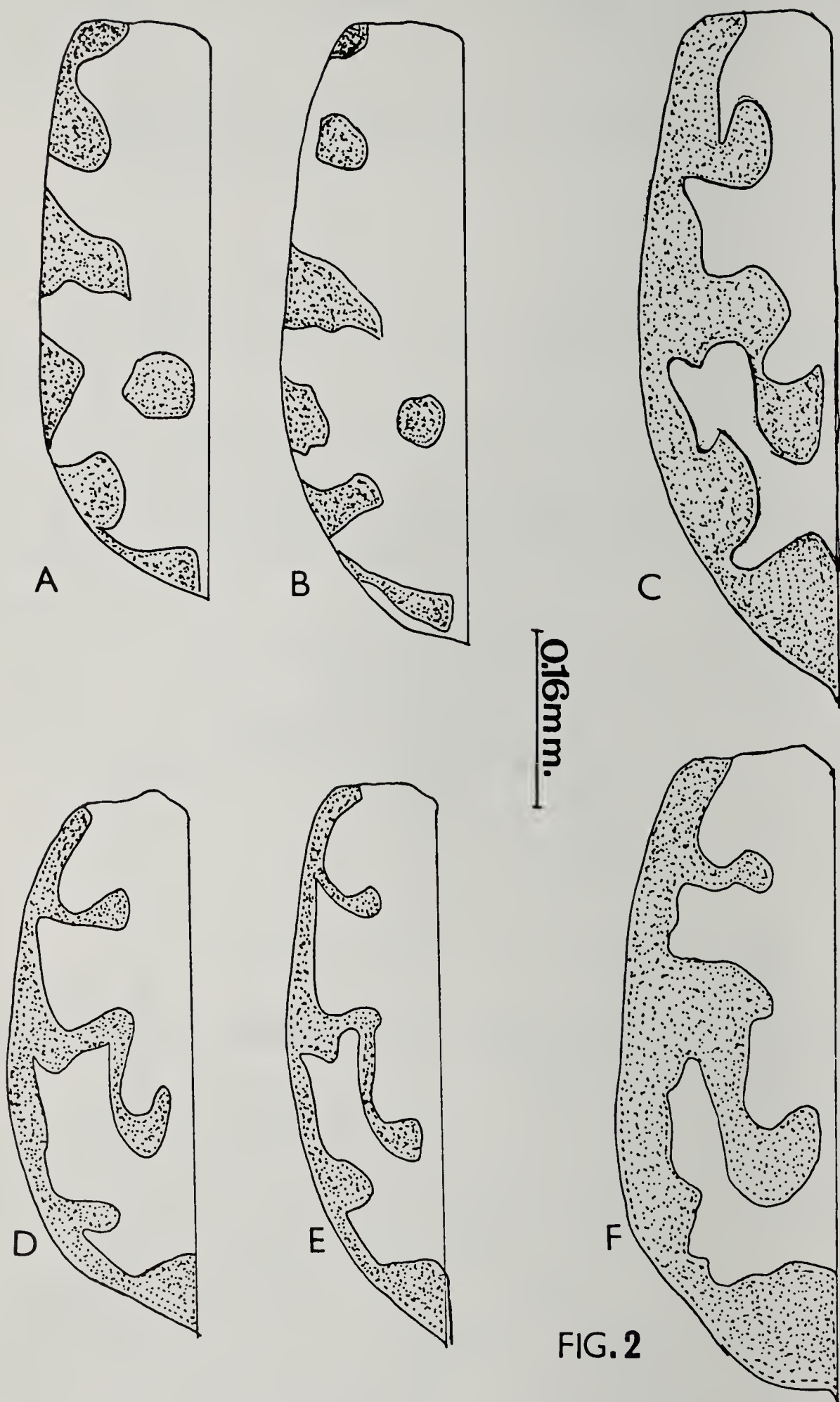


FIG. 2

Fig. 2, elytra: A, *C. euarabica* Ali; B, *C. alboguttata* Klug; C, *C. litorea* Forsk.; D, *C. abbasi* Ali; E, *C. pseudolitorea* Ali; F, *C. litorea jiddaica* Ali.

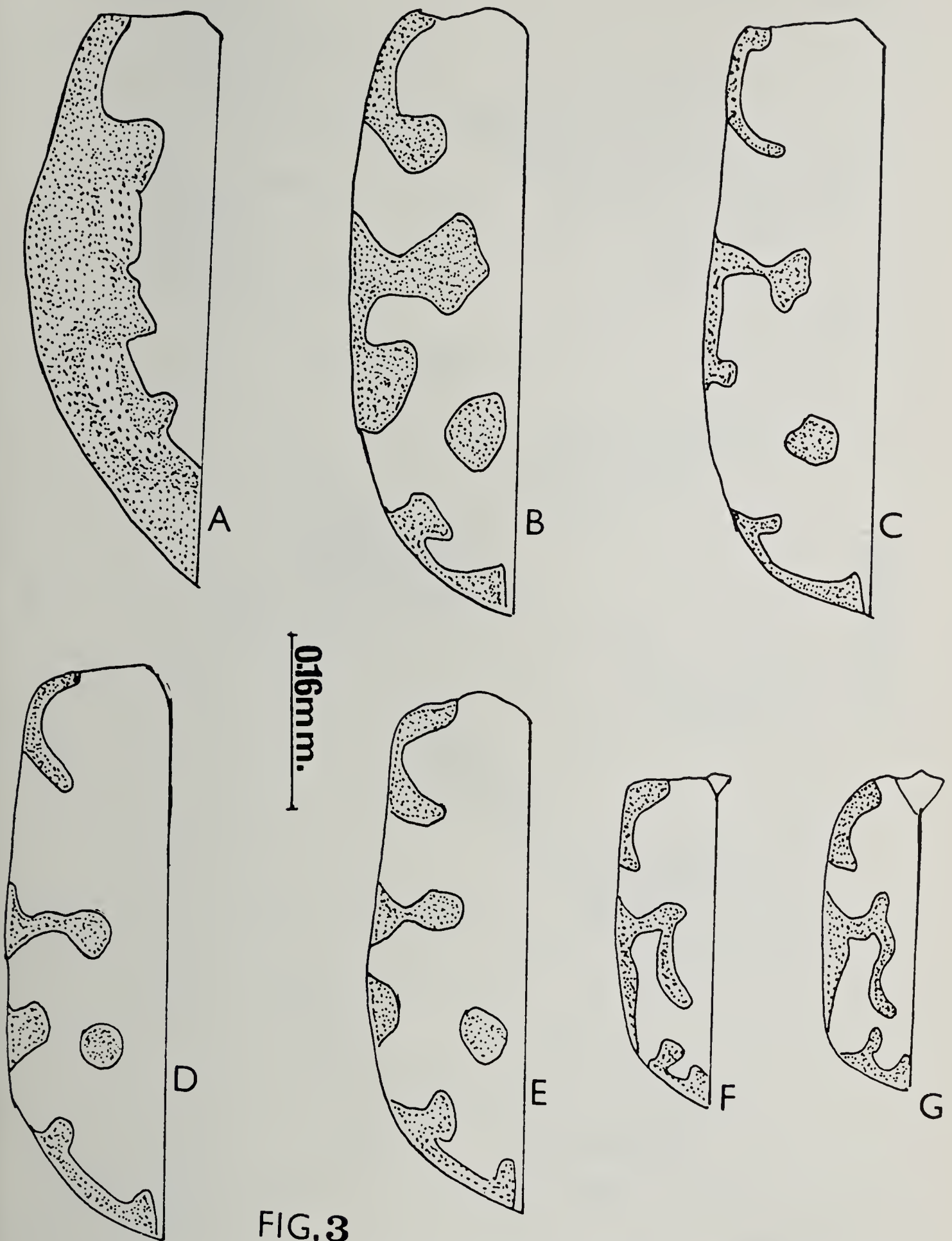


FIG. 3

Fig. 3, elytra: A, *C. litorea eudeserticola* Ali; B, *C. lunulata nemoralis* 01.; C, *C. lunulata khorassanica* Ali; D, *C. aulica diania* Tsch.; E, *C. aulica bahreinica* Ali; F, *C. pygmaea* Dej.; G, *C. nedhalensis* Ali.

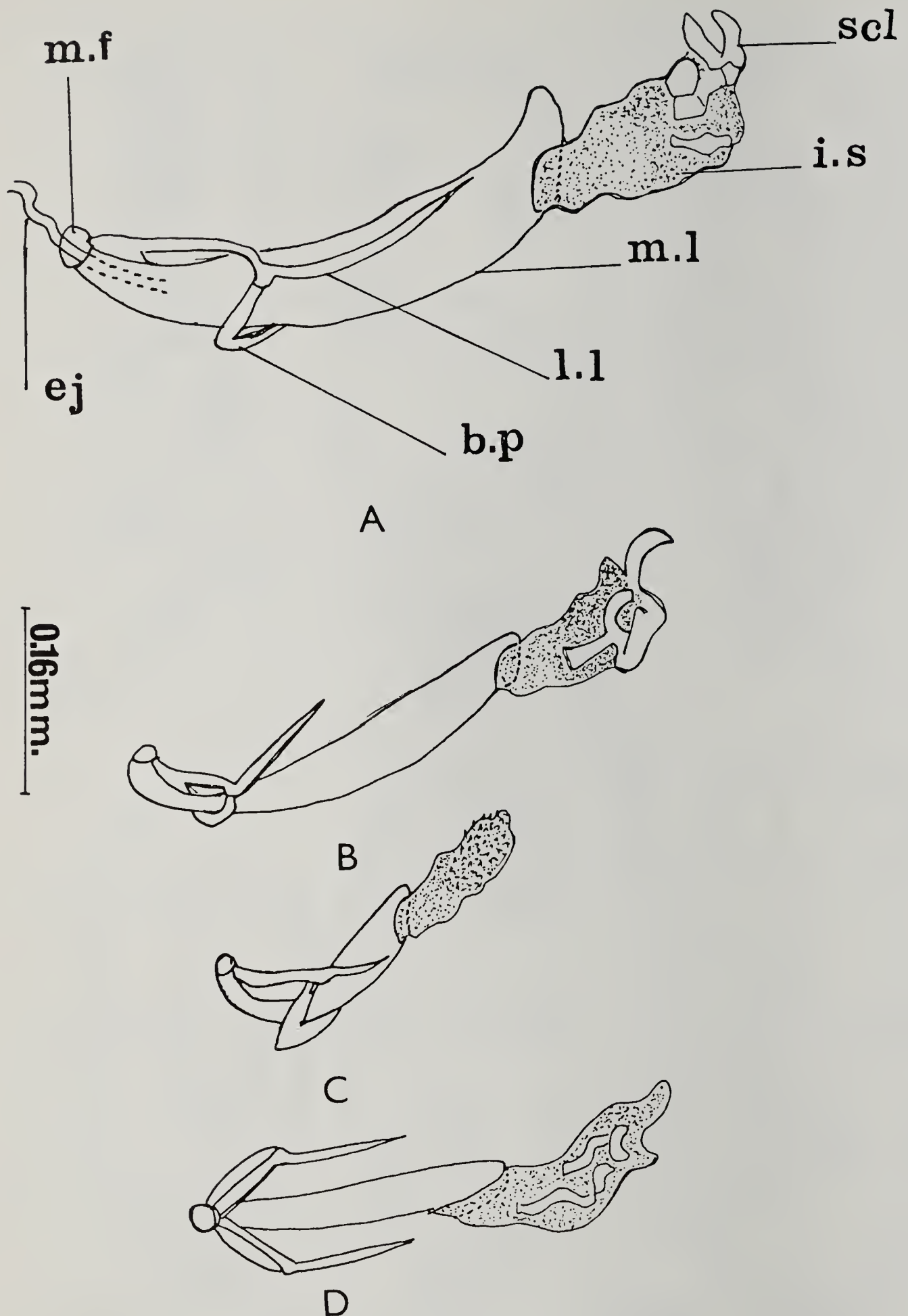


FIG. 4

Fig. 4, male genitalia: A, *C. alboguttata* Klug; B, *C. euarabica* Ali; C, *C. nedhalensis* Ali; D, *C. lunulata khorassanica* Ali (*b. p*= basal piece; *ej*= ejaculatory duct; *i. s*= internal sac; *l. l*= lateral lobes; *m. f*= median foramen; *m. l*= median lobe; *scl*= sclerite).

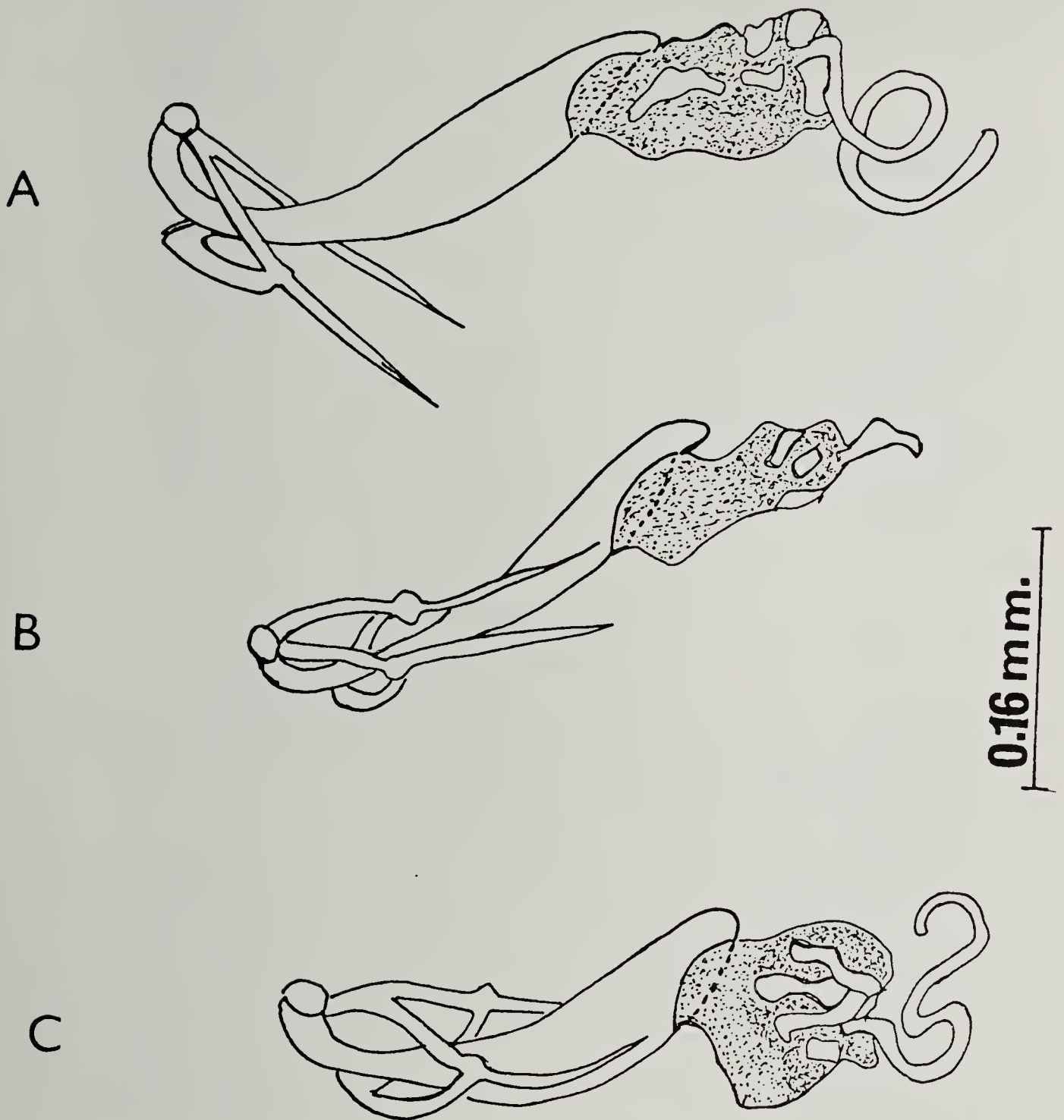


fig.5

Fig. 5, male genitalia: A, *C. pseudolitorea* Ali; B, *C. aulica bahreinica* Ali; C, *C. abbasi* Ali.

DISTRIBUTION TABLE

The distribution of the species and subspecies recorded in the present study is given below for only those localities found in the district of Southwest Asia. For data on the distribution of these taxa outside Southwest Asia, *Col. Cat.* (Horn 1926) should be consulted.

Name of species	Arabia	Arabian Gulf	Iraq	Persia	Syria	Turkey
1. <i>C. abbasi</i> Ali	x					
2. <i>C. alboguttata</i> Klug.	x					
3. <i>C. aphrodisia</i> Baudi		x	x	x	x	x
4. <i>C. asiatica</i> Aud.		x	x	x	x	x
5. <i>C. aulica bahreinica</i> Ali		x				
6. <i>C. aulica aulica</i> Dej.	x		x	x	x	x
7. <i>C. aulica diania</i> Tsch.				x		
8. <i>C. bellana</i> Horn		x	x	x		
9. <i>C. campestris</i> L.	x	x	x	x	x	x
10. <i>C. caucasica</i> Adams			x	x		x
11. <i>C. chiloleuca</i> Fisch.			x	x		x
12. <i>C. concolor</i> Dej.			x		x	x
13. <i>C. contorta</i> Fisch.			x			x
14. <i>C. copulata</i> Schmidt-Geob.			x	x		
15. <i>C. decempustulata</i> Menetr.			x	x		x
16. <i>C. deserticola</i> Fald.			x		x	x
17. <i>C. euarabica</i> Ali	x					
18. <i>C. fischeri</i> Adams			x	x	x	x
19. <i>C. flexuosa</i> Fabr.			x	x		x
20. <i>C. germanica</i> L.	x	x	x	x	x	x
21. <i>C. hanseatica</i> Horn				x		
22. <i>C. helferi</i> Schaum		x	x	x		
23. <i>C. hilariola</i> Bates			x	x		
24. <i>C. histrio</i> Tsch.			x	x		
25. <i>C. immanis</i> Bates		x	x	x		
26. <i>C. ismenia</i> Gory			x		x	x
27. <i>C. lacteola</i> Pallas			x		x	
28. <i>C. litorea litorea</i> Forsk.	x		x		x	
29. <i>C. litorea eudeserticola</i> Ali	x					
30. <i>C. litorea jiddaica</i> Ali	x					
31. <i>C. litterifera</i> Chaud.			x			x
32. <i>C. lunulata lunulata</i> Fabr.			x			x
33. <i>C. lunulata khorassanica</i> Ali				x		
34. <i>C. lunulata nemoralis</i> Ol.		x	x	x		
35. <i>C. melancholica</i> Fabr.	x	x	x	x	x	x
36. <i>C. nedhalensis</i> Ali					x	
37. <i>C. orientalis</i> Dej.			x	x	x	x
38. <i>C. pseudodeserticola</i> Horn			x			x
39. <i>C. pseudolitorea</i> Ali	x					
40. <i>C. pygmaea</i> Dej.	x	x	x	x	x	x
41. <i>C. quadrilineata</i> Fabr.				x		
42. <i>C. rectangularis</i> Klug	x		x	x	x	
43. <i>C. ruppeli</i> Quer.	x					
44. <i>C. schmidti</i> Horn		x		x		
45. <i>C. singularis</i> Chaud.	x		x	x		
46. <i>C. sturmi</i> Mener.			x		x	x
47. <i>C. sublacerata</i> Solsky			x	x		x
48. <i>C. trisignata</i> Dej.			x	x	x	x
49. <i>C. turkestanica</i> Ball.			x			x
50. <i>C. zarudniana</i> Tsch.			x	x		

ANALYSIS OF THE FAUNA OF *Cicindela*

Southwest Asia can be characterized generally by its dry climate, with very hot, dry summers and cool, rainy winters. However in both summer and winter the night temperatures are considerably lower than those of the days. A large part of the area is desert although there are also extensive mountainous districts. The rest consists of fertile plains with rivers and marshes.

There are extensive coastal areas of sea shores specially to the south and west.

Forty-four species and 6 subspecies of the genus *Cicindela* occur in the area. Of these 3(6%) are essentially Ethiopian, 4(8%) Oriental, 7(14%) are widely distributed species, 8(16%) are European and Mediterranean and 28(56%) are more or less restricted to Southwest Asia. The species of each group are given in the following lists.

ETHIOPIAN: *C. rectangularis*, *C. ruppeli*, *C. singularis*.

ORIENTAL: *C. bellana*, *C. copulata*, *C. helferi*, *C. quadrilineata*.

EUROPEAN & MEDITERRANEAN: *C. concolor*, *C. contorta*, *C. fischeri*, *C. flexuosa*, *C. lacteola*, *C. litterifera*, *C. sturmi*, *C. trisignata*.

WIDELY DISTRIBUTED SPECIES: *C. alboguttata*, *C. aulica*, *C. campestris*, *C. germanica*, *C. lunulata*, *C. melancholica*, *C. sublacerata*.

SOUTHWEST ASIA: *C. abbasi*, *C. aphrodisia*, *C. asiatica*, *C. aulica bahreinica*, *C. aulica diania*, *C. caucasica*, *C. chiloleuca*, *C. decempustulata*, *C. deserticola*, *C. euarabica*, *C. hilariola*, *C. histrio*, *C. hanseatica*, *C. immanis*, *C. ismenia*, *C. litorea litorea*, *C. litorea jiddaica*, *C. litorea eudeserticola*, *C. lunulata khorassanica*, *C. lunulata nemoralis*, *C. nedhalensis*, *C. orientalis*, *C. pseudodeserticola*, *C. pseudolitorea*, *C. pygmaea*, *C. schmidti*, *C. turkestanica*, *C. zarudinana*.

Genus *Megacephala* Latr.

Latreille, 1802, Hist. Nat. Crust. Ins. III, p. 79.

Type: *Cicindela sengalensis* L.

The genus *Megacephala* is only represented by a single species here with a very wide range in the Palaearctic and Oriental regions, *M. euphratica* Latr. & Dej. This is a stout and robust species; head and pronotum green with more or less violaceous reflections. Labrum and mouthparts testaceous; mandibles dark towards apex with 3 apical teeth. Head not contracted behind, as broad as pronotum; the latter widened in front and gradually narrowed to the base. Elytra oblong, slightly rounded at sides, green with apex broadly testaceous; elytral disc purplish in colour; elytral sculpture heavy, becoming much finer behind. Legs including coxae and trochanters testaceous.

Underside bluish green to blue or purple, darker at abdominal apex.

Length 19-26 mm.

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